

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

1. (Currently Amended) A plasma processing method, ~~in which a process gas is introduced into an evacuated process chamber for subjecting a target object to a plasma processing,~~ comprising:

newly introducing a process gas into an evacuated process chamber to generate plasma;

performing a plasma processing of a target object;

exhausting said process gas from said evacuated process chamber;

introducing again at least a part of the said process gas exhausted from said process chamber into said process chamber;

obtaining ~~specified values by~~ a predetermined property value to monitor ~~monitoring the state of the~~ said plasma of the said process gas within the said process chamber; and

controlling the ~~an~~ introducing ~~conditions~~ condition of the said process gas into the said process chamber so as to adjust a said predetermined property value to a regulated value.

2. (Currently Amended) The plasma processing method according to claim 1, wherein said introducing ~~conditions~~ condition of the said process gas is controlled ~~by~~ in accordance with changing a circulating ratio, which is a ratio of the flow rate of the process gas introduced again into said process chamber to the flow rate of entire gas introduced into the process chamber, ~~and said predetermined property value is a~~

~~property value allowing the change in the state of the plasma accompanying the change in said circulating ratio to be correlated to process characteristics of said target object.~~

3. (Currently Amended) The plasma processing according to claim 2, wherein ~~the said~~ introducing ~~conditions~~ condition of said process gas is controlled by controlling the flow rate of the process gas introduced again into said process chamber.

4. (Currently Amended) The plasma processing method according to claim 2, wherein ~~the said~~ introducing ~~conditions~~ condition of said process gas is controlled by controlling the flow rate of the process gas newly introduced into said process chamber.

5. (Previously Presented) The plasma processing method according to claim 4, wherein said process gas newly introduced into said process chamber is a mixed gas comprising at least two kinds of gases, and the flow rate of the process gas newly introduced into the process chamber is controlled by controlling the flow rate ratio of the components of said mixed gas.

6. (Currently Amended) The plasma processing method according to claim 2, wherein said target object is a silicon oxide film formed on a silicon substrate; said silicon oxide film is processed by a plasma processing; and said regulated value is determined by a said property value obtained before changing said circulating ratio.

7. (Currently Amended) The plasma processing method according to claim 6, wherein said regulated value is determined by a said property value when said circulating ratio is zero.

8. (Currently Amended) The plasma processing method according to claim 2, wherein said process chamber is a chamber after deposition of a silicon oxide film on a substrate; said target object is a silicon oxide film attached to the inner wall of said

process chamber; said silicon oxide film is removed by said plasma processing; said ~~process characteristics represent~~ state of the plasma is correlated to the removal rate of said silicon oxide film; and said regulated value is ~~said~~ a property value representing that said removal rate is the maximum.

9. (Previously Presented) The plasma processing method according to claim 8, wherein said process gas is a gaseous mixture containing C and F, and said property value represents the light emission intensity of SiF₄.

10. (Previously Presented) The plasma processing method according to claim 2, wherein at least a part of the process gas exhausted from said process chamber is introduced again into said process chamber without adjusting substantially the components of said process gas.

11. (Currently Amended) A plasma processing method, ~~in which a process gas is introduced into an evacuated process chamber for subjecting a target object to a plasma processing,~~ comprising:

newly introducing a process gas into an evacuated process chamber to generate plasma;

performing a plasma processing of a target object;

obtaining a predetermined property value to monitor the state of said plasma of said process gas within said process chamber;

exhausting said process gas from said evacuated process chamber;

introducing again at least a part of the said process gas exhausted from said process chamber into said process chamber;

~~obtaining specified values by monitoring the state of the plasma gas within the process chamber; and~~

controlling the an introducing ~~conditions~~ condition of the said process gas into the process chamber so as to adjust a said predetermined property value to a regulated value, said introducing condition being controlled in accordance with changing a circulating ratio, which is a ratio of the flow rate of the process gas introduced again into the process chamber to the flow rate of the entire process gas introduced into the process chamber;

~~wherein said predetermined property value is a property value allowing the change in the state of the plasma in changing the circulating ratio, which is a ratio of the flow rate of the process gas introduced again into the process chamber to the flow rate of the entire process gas introduced into the process chamber, to be correlated to the process characteristics of the target substrate; and~~

wherein said state of said plasma is correlated to the process characteristics of said target object; and

said regulated value is determined by a ~~represents said~~ property value obtained before changing the circulating ratio accompanied with changing said state of said plasma.

12. (Currently Amended) The plasma processing method according to claim 11, wherein ~~the~~ said introducing ~~conditions~~ condition of said process gas ~~are~~ is controlled by controlling the flow rate of the process gas introduced again into said process chamber.

FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com

13. (Currently Amended) The plasma processing method according to claim 11, wherein ~~the~~ said introducing ~~conditions~~ condition of said process gas ~~are~~ is controlled by controlling the flow rate of the process gas newly introduced into said process chamber.

14. (Previously Presented) The plasma processing method according to claim 11, wherein said process gas newly introduced into said process chamber is a mixed gas comprising at least two kinds of gaseous components; and the flow rate of the process gas newly introduced into said process chamber is controlled by controlling the flow rate ratio of the components of said mixed gas.

15. (Currently Amended) The plasma processing method according to claim 11, wherein said process gas introduced into the process chamber contains a gaseous component having C and F; a silicon oxide film that is processed by an etching is ~~formed~~ provided on the surface of ~~said target~~ a silicon substrate; and said predetermined property value represents the intensity of the light emission from CF₂ radicals.

16. (Previously Presented) The plasma processing method according to claim 11, wherein at least a part of the process gas exhausted from said process chamber is introduced again into the process chamber without adjusting substantially the components of the process gas.

17. (Currently Amended) The plasma processing method according to claim 11, wherein said regulated value is determined by a ~~represents said~~ property value when said circulating ratio is zero.

FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com

18. (Withdrawn) A plasma processing method, in which a process gas is introduced into an evacuated process chamber for forming a thin film on the surface of a substrate, comprising:

introducing again at least a part of the process gas exhausted from said process chamber into said process chamber while processing said thin film attached to said surface within said process chamber;

monitoring the rate of change in the thickness of said thin film attached to said surface within said process chamber; and

controlling the introducing conditions of the process gas into the process chamber in changing the circulating ratio of the process gas into the process chamber so as to allow the rate of change in the thickness of said thin film to form a regulated value;

wherein said regulated value is a rate of change in the thickness of the thin film obtained before changing the circulating ratio.

19. (Withdrawn) The plasma processing method according to claim 18, wherein the rate of change in the thickness of said thin film is measured by monitoring

20. (Withdrawn) The plasma processing method according to claim 19, wherein the introducing conditions of said process gas are controlled by controlling the flow rate of the process gas introduced again into the process chamber.

21. (Withdrawn) The plasma processing method according to claim 19, wherein the introducing conditions of said process gas are controlled by controlling the flow rate of the process gas newly introduced into the process chamber.

22. (Withdrawn) The plasma processing method according to claim 19, wherein the process gas newly introduced into said process chamber is a mixed gas containing at least two kinds of gaseous components; and the flow rate of the newly introduced process gas is controlled by controlling the flow rate ratio of the gaseous components of said mixed gas.

23. (Withdrawn) The plasma processing method according to claim 19, wherein said process gas introduced into the process chamber contains a gaseous component having C and F; a silicon oxide film that is processed by an etching is attached to said surface within said process chamber; and said property value represents the intensity of the light emission from CF_2 radicals.

24. (Withdrawn) The plasma processing method according to claim 19, wherein at least a part of the process gas exhausted from said process chamber is introduced again into the process chamber without adjusting substantially the components of the process gas.

25. (Withdrawn) The plasma processing method according to claim 19, wherein said regulated value represents the rate of change in the thickness of said thin film when said circulating ratio is zero.

26. (Withdrawn) A plasma processing method, in which a process gas is introduced into an evacuated process chamber so as to process a thin film on the surface of a substrate, comprising:

introducing again at least a part of the process gas exhausted from said process chamber into said process chamber;

monitoring the rate of change in the thickness of a thin film formed on the surface of said substrate within said process chamber; and

controlling the introducing conditions of the process gas into the process chamber in changing the circulating ratio of the process gas introduced again into the process chamber so as to adjust the rate of change in the thickness of the thin film to a regulated value;

wherein said regulated value is the rate of change in the thickness of said thin film obtained before changing the circulating ratio.

27. (Withdrawn) The plasma processing method according to claim 26, wherein the change in said circulating ratio is brought about by changing the flow rate of the process gas newly introduced into said process chamber.

28. (Withdrawn) The plasma processing method according to claim 26, wherein the change in said circulating ratio is brought about by changing the flow rate of the process gas introduced again into said process chamber.

29. (Withdrawn) The plasma processing method according to claim 26, wherein said process gas introduced into the process chamber contains a gaseous component having C and F; a silicon oxide film that is processed by an etching is formed on the surface of said substrate; and said property value represents the intensity of the light emission from CF₂ radicals.

30. (Withdrawn) The plasma processing method according to claim 26, wherein at least a part of the process gas exhausted from said process chamber is introduced again into the process chamber without adjusting substantially the components of the process gas.

31. (Withdrawn) The plasma processing method according to claim 26, wherein said regulated value represents the rate of change in the thickness of said thin film when said circulating ratio is zero.

FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER ^{LLP}

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com